TITLE OF THE INVENTION

IMAGE MANAGING APPARATUS AND METHOD, IMAGE RETRIEVING

APPARATUS AND METHOD, AND STORAGE MEDIUM

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BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an image managing

10 apparatus for retrievably managing images stored in memory

means, an image retrieving apparatus for retrieving an image

stored in an image memory, an image managing method, an

image retrieving method, and a storage medium.

Description of the Related Art

15 According to an image managing method for retrievably

managing images stored in memory means, information serving

as keywords are appended one after another to images. The

images are managed in association with the appended

information. For retrieving a thus managed image, a keyword

20 equivalent to information with which the image is managed is

input. Candidate images are then retrieved based on the

interaction of the input keyword with information with which

the image is managed.

However, according to the foregoing image managing

25 method, images are managed in association with information

appended one after another to the images. A keyword to be input for retrieving an image is an equivalent of information appended to the image. Therefore, a high retrieving ability cannot be achieved. Candidate images not

5   including a desired image or candidate images not needed at all may be extracted as a result of retrieval. The retrieving ability is therefore low.

An object of the present invention is to provide an image managing apparatus, an image managing method, and a

10   storage medium offering an improved retrieving ability.

Another object of the present invention is to provide an image managing apparatus, an image managing method, and a storage medium enabling easy input of information with which an image is managed.

15   Still another object of the present invention is to provide an image retrieving apparatus, an image retrieving method, and a storage medium enabling easy input of retrieval information with which an image is retrieved.

SUMMARY OF THE INVENTION

20   According to one aspect of the present invention, there is provided an image managing apparatus for managing retrievable images. The image managing apparatus includes input means for inputting relevant information concerning an

25   object within an image, and memory means in which relevant

information input by the input means is stored in
association with objects.

BRIEF DESCRIPTION OF THE DRAWINGS

5   Fig. 1 is a block diagram showing the configuration of
an embodiment of an image managing apparatus in accordance
with the present invention;

        Fig. 2A to Fig. 2E show the structure of an object unit
employed in managing an image by the image managing

10   apparatus shown in Fig. 1;

        Fig. 3 shows an example of images managed by the image
managing apparatus shown in Fig. 1;

        Fig. 4 shows an example of descriptions of the image
shown in Fig. 3 to be specified in an object unit;

15   Fig. 5 shows the structure of supplementary information
employed in managing an image by the image managing
apparatus shown in Fig. 1;

        Fig. 6 is a flowchart describing a procedure of
inputting object unit information to be used by the image

20   managing apparatus shown in Fig. 1;

        Fig. 7 is a flowchart describing a procedure of
inputting relationship unit information to be used by the
image managing apparatus shown in Fig. 1; and

        Fig. 8 is a flowchart describing a retrieval process of

25   the image managing apparatus shown in Fig. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the present invention will be described below with reference to the drawings.

Fig. 1 is a block diagram showing the configuration of an embodiment of an image managing apparatus in accordance with the present invention.

An image managing apparatus has, as shown in Fig. 1, a CPU 11. The CPU 11 runs processes for, for example, image management and image retrieval according to a program stored in a ROM 12. A RAM 13 is used to provide a work area for the CPU 11.

A keyboard 15, a mouse 16, a display 17 capable of displaying images in colors, and a hard disk drive (HD) 14 are connected to the ROM 12, the RAM 13, and the CPU 11 by a bus 18. The CPU 11 controls these blocks. The keyboard 15 includes various kinds of keys used to designate various kinds of environments for data input accompanying each processing, processing, or operations. The mouse 16 is used to instruct the data input accompanying each processing, processing, or operations. The display 17 displays an image contained in an image file stored in the hard disk drive 14, a window assigned to each processing, or the like.

The image file and image management information used to manage images contained in the image file are stored in the

hard disk drive 14. The images and image management information are managed while being mutually associated. The image management information consists of information specified in object units describing objects contained in each image and supplementary information of the image.

Next, the object unit will be described with reference to Fig. 2A to Fig. 2E. Fig. 2A to Fig. 2E show the structure of the object unit employed in managing an image by the image managing apparatus shown in Fig. 1.

An object unit 20 describing an object contained in an image consists of, as shown in Fig. 2A, a place division 22, an attribute pointer division 24, an object name division 26, a proper noun division 28, and a unit pointer division 30. The position of the object in a screen is specified in the place division 22. A pointer indicating a qualification unit is specified in the attribute pointer division 24. A general name is specified in the object name division 26. A proper noun is specified in the proper noun division 28. Pointers indicating other object units are specified in the unit pointer division 30.

Fig. 2B schematically shows a qualification unit 32. The pointer indicating a qualification unit indicates a position at which the qualification unit resides. Qualifiers appended to the object are specified in the qualification unit. The qualification unit is structured so

that a plurality of qualifiers can be specified therein and one object can thus be qualified with a plurality of qualifiers.

The pointers indicating other objects indicate other
5 object units to be linked. The other object units include, as shown in Fig. 2C, an internal relationship unit 34 in which an object included in an object (for example, an object of a face included in an object of a human being) is specified. The internal relationship unit represents an
10 internal relationship between objects. The other object units also include, as shown in Fig. 2D, a state unit 36 for expressing the state of an object. For example, when it is necessary to express the state of an object of a human being, that is, a "standing" state, a state unit expressing the
15 "standing" state is linked to the object unit describing the human being.

The other object units also include, as shown in Fig. 2E, a relationship unit 38 for expressing the relationship of an object to another object. For example, an object of a
20 human being and an object of a motorcar have the relationship that the human being is riding in the motorcar. The relationship unit 38 expresses the relationship that the human being is riding. The relationship unit 38 is linked to two object units and specifies one verb. A plurality of
25 relationship units is permitted. For example, for

expressing the relationship that the human being is riding in the motorcar and driving it, relationship units having "riding" and "driving" specified therein respectively are linked to the object unit describing the human being.

5   Supplementary information of an image includes imaging-related data, special object data, category data, impression data, time data, place data, weather data, and event data. The supplementary information will be detailed later.

Next, an example of descriptions specified in an object
10   unit will be described with reference to Fig. 3 and Fig. 4. Fig. 3 shows an example of images managed by the image managing apparatus shown in Fig. 1. Fig. 4 shows an example of descriptions specified in an object unit assigned to the image shown in Fig. 3.

15   The image shown in Fig. 3 shows a man standing on the left surprised at a cat eating a mouse on a round table on the right. In the image, the cat is regarded as a first object, the mouse is regarded as a second object, the table is regarded as a third object, and the man is regarded as a
20   fourth object. As shown in Fig. 4, an object unit in which "middle right" is specified as a position, "fat" is specified as a qualifier, "cat" is specified as a general name, and "Mike" is specified as a proper noun is assigned to the first object (cat). An object unit in which "middle
25   right" is specified as a position and "mouse" is specified

as a general name is assigned to the second object (mouse). However, no description of a qualifier and a proper noun are specified in the object unit. An object unit in which "lower right" is specified as a position, "round" is

5 specified as a qualifier, and "table" is specified as a general name is assigned to the third object (table). However, no description of a proper noun is specified in the object unit. An object unit in which "left" is specified as a position, "tall" and "male" are specified as qualifiers,

10 "human being" is specified as a general name, and "Ryoichi Kosugi" is specified as a proper noun is assigned to the fourth object (man). An internal relationship unit and a state unit are linked to the object unit describing the fourth object. The internal relationship unit is a unit

15 describing an object of a face included in the fourth object, wherein "upper left" is specified as a position, "surprised" is specified as a qualifier, and "face" is specified as a general name. No description of a proper noun is specified in the internal relationship unit. The state of the fourth

20 object, that is, "standing" is specified in the state unit. Moreover, a relationship unit expressing the relationship between the first object and the fourth object links the first and fourth objects. A verb "eating" expressing that the cat is eating the mouse is specified in the relationship

25 unit. Moreover, a relationship unit expressing the

relationship between the first object and the third object links the first and third objects. A verb "lying" expressing that the cat is lying on the table is specified in the relationship unit.

5   Owing to the descriptions, unlike when words serving as keywords are merely enumerated as they are conventionally, it is possible to clarify what objects an image consists of and how the image is composed.

Next, supplementary information of an image will be
10   described with reference to Fig. 5. Fig. 5 shows the structure of supplementary information employed in managing an image by the image managing apparatus shown in Fig. 1. The supplementary information of an image is, as shown in Fig. 5, managed in association with the image together with
15   the foregoing descriptions of objects, that is, the object units (including units linked to the units). The supplementary information includes imaging-related data, special object data, category data, impression data, time data, place data, weather data, and event data.

20   In the imaging-related data, an imaging person, a year/month/day/time of imaging, a place of imaging, imaging equipment, and the state of light for imaging (forward light or back light) can be specified. For example, when an image is a photograph of a human figure, the human figure can be
25   described in an object unit but a person taking the

photograph, or imaging person, cannot be described. However, the imaging person can be specified in the imaging-related data. Consequently, the imaging person and the imaged human figure can be used as keywords to retrieve the image. The

5   retrieval using the keywords permits reliable extraction of candidate images from a narrow range of images.

In the special object data, an art object, a commodity, a frame (pattern), a three-dimensional image, a computer graphic (CG), an illustration, a test, and a logo can be

10   specified. The art object includes a painting and is detailed with the field of a work, the title of the work, a producer's name, and a year/month/day of production. The commodity is detailed with a general name, a product name, and a date of sale. The frame includes a picture frame

15   enclosing a photograph. The illustration is detailed with an illustrator's name and the title of an illustration. For example, when the special object data is appended to an image that is a painting, the painting can be retrieved using the painter and objects appearing in the painting as

20   keywords. Candidate images can be reliably extracted from a narrow range.

The category data represents the category of an image such as a landscape image, a figure image, or a vehicle image. The impression data represents an impression on an

25   image. For example, such an impression as "flamboyant,"

"sober," or "bright" is specified. The time data represents a season and a time of day. If a year/month/day of imaging is specified in the imaging-related data, the time data may be thought to be unnecessary. However, in many cases, it is

5   impossible to enter a year/month/day of imaging accurately for retrieval. If a season or the like is specified, it often works effectively during retrieval. The place data represents a place expressed in an image. The weather data represents weather such as raining or snowing. The event

10   data represents a celebration or memorial service such as a festival for children of three, five, and seven years of age or a wedding.

Owing to the foregoing supplementary information, information that cannot be expressed using the object unit

15   can be associated with an image. When a query indicating information corresponding to information specified in an object unit and information corresponding to supplementary information is designated for retrieval, candidate images can be extracted very precisely.

20   For example, assume that the image shown in Fig. 3 is a painting produced by a painter Mr. M. For retrieving the image, a retriever designates a query indicating a painting produced by painter Mr. M and depicting that a man standing on the left is surprised at a cat. Candidate images

25   including the image shown in Fig. 3 are then extracted. If

object units alone were described, other images meeting the requirement that a man standing left is surprised at a cat would be extracted. If numerous images meeting the requirement are stored, the number of candidate images to be

5   extracted would be so large that it would take a great deal of time to select an intended image from among the numerous candidate images. In contrast, when "painting" and "producer M" are appended as supplementary information of an image together with the object units to the image, the

10   number of candidate images including the image shown in Fig. 3 is small. The image shown in Fig. 3 can therefore be extracted very precisely. Namely, a high retrieving ability can be achieved.

As mentioned above, in the present embodiment, each

15   image is managed in such a manner that image management information consisting of information specified in object units, which describe objects appearing in an image, and supplementary information are associated with the image. Retrieval can therefore be achieved using a query indicating

20   the information specified in the object units, which describe the objects in the image, and the supplementary information. Candidate images can therefore be extracted very precisely. Namely, a retrieving ability can be improved.

25   Next, an object unit information input procedure for

inputting information to be specified in an object unit will be described with reference to Fig. 6. Fig. 6 is a flowchart describing a procedure for inputting object unit information to be used by the image managing apparatus shown

5   in Fig. 1.

In the object unit information input, as described in Fig. 6, first, at step S101, an image for which management information is input is selected and displayed on the display 17. Control is then passed to step S102. Control

10   waits until a position in the displayed image area is designated using the keyboard 15 or the mouse 16. When a position in the image area is designated, control is passed to step S103. It is judged from position information of the designated position whether an object is present. If no

15   object is present at the designated position, control is passed to step S107. An error is indicated. Control is then returned to the step S102 and waits until a position in an image area is designated.

If an object is present at the designated position,

20   control is passed to step S104. An input window is displayed at the designated position within the image area. The input window may be structured as an entry form having items shown as in Fig. 2A written therein. In this case, the input window consists of divisions in which the position

25   of an object in a screen, a pointer indicating a

qualification unit, a general name, a proper noun, and
pointers indicating other object units are specified
respectively. Information concerning a position may be
input using the keyboard 15 or the mouse 16. Alternatively,

5 position information representing an object located at the
position may be automatically input based on the position
information of the designated position.

For inputting information to be specified in a
qualification unit, the qualification unit is designated

10 using the keyboard 15 or the mouse 16. An input window used
to input information to be specified in the qualification
unit, that is, qualifiers, is then displayed. Qualifiers
are entered in the input window. The qualification unit
having the qualifiers specified therein is automatically

15 associated with the object. A general name and a proper
noun are entered in the input window used to input
information to be specified in the object unit. Other
object units include the internal relationship unit shown in
Fig. 2C, the state unit shown in Fig. 2D, and the

20 relationship unit shown in Fig. 2E. A window used to select
any of the units in which information to be input is
specified is displayed. Any of the internal relationship
unit, the state unit, and the relationship unit in which
information to be input is specified is selected in the

25 window, and then information is input. Input of information

to be specified in the relationship unit will be described
later.

Thereafter, control is passed to step S105. It is
judged whether input of information to be specified in the
5 items of the displayed input window has been completed. If
input has been completed, control is passed to step S106.
The input information is stored in association with the
displayed image in the hard disk drive 14. This procedure
is then terminated.

10 Next, input of information to be specified in the
relationship unit will be described with reference to Fig. 7.
Fig. 7 is a flowchart describing the input of relationship
unit information to be used by the image managing apparatus
shown in Fig. 1.

15 Assume that input of information to be specified in the
relationship unit is selected at step S104 in Fig. 6. As
described in Fig. 7, first, at step S201, control waits
until the position of a relational source object in a
displayed image is designated. If the position of the
20 relational source object is designated, control is passed to
step S202. It is then judged whether the relational source
object is present at the designated position. If no
relational source object is present at the designated
position, control is passed to step S208. An error is then
25 indicated, and control is returned to step S201.

If the relational source object is present at the
designated position, control is passed to step S203.
Control then waits until the position of a relational
destination object relative to the relational source object

5   is designated. If the position of the relational
destination object is designated, control is passed to step
S204. It is then judged whether the relational destination
object is present at the designated position. If no
relational destination object is present at the designated

10 position, control is passed to step S208. An error is
indicated, and control is returned to step S201.

If the relational destination object is present at the
designated position, control is passed to step S205. A
relationship unit input window is displayed. Herein, the

15 example shown in Fig. 3 is taken for instance. Assume that
the cat is regarded as a relational source and the table is
regarded as a relational destination. For inputting
information to be specified in the relationship unit, the
table is designated as an object serving as the relational

20 destination of the cat. The information "lying" is input in
order to express the relationship between the object of the
cat and the object of the table.

Control is then passed to step S206. It is then judged
whether input has been completed. If input has been

25 completed, control is passed to step S207. Input

information specified in the relationship unit is stored in

the hard disk unit 14. For example, the information "lying"

links, as shown in Fig. 4, the object of the cat and the

object of the table. This procedure is then exited.

5 Control is then returned to the step S104 in Fig. 6.

Next, a retrieval procedure run by the image managing

apparatus will be described with reference to Fig. 8. Fig.

8 is a flowchart describing a retrieval procedure performed

by the image managing apparatus shown in Fig. 1.

10 A retrieval procedure is run for retrieving an image

stored in the hard disk drive 14. As described in Fig. 8,

first, at step S301, a virtual window virtually defining an

image area is displayed on the display 17. Control is then

passed to step S302 and waits until a position in the

15 virtual window is designated. If a position in the virtual

window is designated, control is passed to step S303. A

retrieval-related query input window is displayed. The

retrieval-related query input window is realized with a

window having the same structure as the object unit shown in

20 Fig. 2. The window is used to input necessary retrieval

information. For example, for retrieving an image with an

object of the man shown in Fig. 3 as a reference, "left,"

"tall," "male," and "standing" are input as shown in Fig. 4.

Control is then passed to step S305. The input

25 retrieval-related query is stored in the RAM 13. At the

next step S306, retrieval is performed with reference to the input retrieval-related query and image management information (object units). At step S307, candidate images extracted through retrieval are displayed on the display 17.

5   This procedure is then exited.

In this retrieval, retrieval information concerning one object is input. Alternatively, information concerning a plurality of objects may be input simultaneously. In this case, the steps S302, 303, and 304 are repeated for each

10   object.

As mentioned above, according to the present embodiment, the adoption of object units makes it possible to clarify the kinds of objects an image includes and how the image is composed. The object unit consists of a place division, an

15   attribute pointer division, an object name division, a proper noun division, and a unit pointer division. The position of an object in a screen is specified in the place division. A pointer indicating a qualification unit is specified in the attribute pointer division. A general name

20   is specified in the object name division. A proper noun is specified in the proper noun division. Pointers indicating other object units are specified in the unit pointer division. For retrieval, retrieval information can be input as if a speech was made. A candidate image desired by a

25   retriever can be retrieved with a high probability.

Moreover, information to be specified in an object unit can be input easily by inputting object unit information and/or relationship unit information. The object unit information relates to information concerning an object. Furthermore,

5 retrieval information can be input easily.

The present embodiment relates to one apparatus. Alternatively, the present invention may be applied to a system consisting of a plurality of equipment (for example, a host computer, interface equipment, a reader, a printer,

10 etc.).

Moreover, a working mode described below is included in the scope of the present invention. Namely, a computer (CPU or MPU) included in an apparatus or a system is connected to various devices so that the various devices can be operated

15 in order to realize the aforesaid constituent features of the embodiment. Coded software programs for realizing the constituent features of the embodiment are supplied to the computer included in the system or apparatus. The computer included in the system or apparatus instructs the various

20 devices to operate according to the programs.

In the working mode, the coded software programs realize the constituent features of the embodiment. The programs themselves and a means for supplying the programs to the computer, for example, a storage medium in which the

25 programs are stored, constitute the present invention.

The storage medium in which the programs are stored may be, for example, a floppy disk, a hard disk, an optical disk, a magneto-optical disk, a CD-ROM, a magnetic tape, a nonvolatile memory card, or a ROM, for example.

5   In the foregoing mode, when the computer runs any of the supplied programs, the associated constituent feature of the embodiment is realized. In another mode, when a coded program cooperates with an operating system (OS) residing in a computer or with another application program software, the

10 associated constituent feature of the embodiment is realized. Even this mode is included in the scope of the present embodiment.

In still another mode, a supplied coded program is stored in a memory included in an extension board of the

15 computer or an extension unit connected to the computer. Thereafter, a CPU or the like included in the extension board or extension unit carries out a part or the whole of actual processing according to instructions described in the program. The associated constituent feature of the

20 aforesaid embodiment is realized through the processing. Even this mode is included in the scope of the present invention.

As described so far, according to the present invention, an image managing apparatus includes input means and

25 managing means. The input means inputs information to be

specified in an object unit assigned to each object
contained in an image. The object unit consists of unit
divisions in which such information as a general name, a
qualifier, a proper noun, and a position are specified. The
5 managing means stores the object unit having input
information specified therein in an object unit memory means,
and manages images stored in memory means in association
with object units stored in the object unit memory means.
This results in an improved retrieving ability.

10 According to the present invention, the input means of
the image managing apparatus includes display means,
position designating means, and input window display means.
The display means displays an image. The position
designating means designates the position of an object
15 concerned in the displayed image. The input window display
means displays an object unit input window, which is used to
input information to be specified in an object unit, at the
designated position. Consequently, information to be
specified in an object unit for managing an image can be
20 input easily.

According to the present invention, the managing means
of the image managing apparatus includes retrieval
information input means and retrieving means. The retrieval
information input means inputs retrieval information
25 corresponding to information specified in object units. The

retrieving means retrieves candidate images conformable to the retrieval information from the memory means according to the retrieval information and the information specified in the object units.

5   According to the present invention, an image managing apparatus includes input means and managing means. The input means inputs information concerning each object appearing in an image. The managing means stores the input information in a management information memory means and 10   manages information stored in the management information memory means in association with images. The input means includes display means, position designating means, and input window display means. The display means displays an image. The position designating means designates the 15   position of an object of interest in, the displayed image. The input window display means displays an information input window used to input information concerning an object at the designated position. Information used to manage an image can therefore be input easily.

20   According to the present invention, an image retrieving apparatus includes retrieval information input means for inputting retrieval information and extracting means for extracting candidate images from an image memory according to the retrieval information. The input means includes 25   display means, position designating means, retrieval

information input window display means, and retrieval

information acquiring means. The display means displays a

virtual window virtually defining an image area. The

position designating means designates a position in the

5   displayed virtual window. The retrieval information input

window display means displays a retrieval information input

window used to input information concerning the retrieval

information at the designated position. The retrieval

information acquiring means acquires position information of

10   the designated position in the virtual window and the

information entered in the retrieval information input

window as retrieval information. The retrieval information

used to retrieve an image can therefore be input easily.